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REPORT TO THE CONGRESS

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Improved Use Of Cargo Space On Ammunition Ships By Better Planning B-133025

Department of Defense

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

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MARCH 21, 1972



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-133025

To the President of the Senate and the
Speaker of the House of Representatives

This is our report on how the Department of Defense improved use of cargo space on ammunition ships by better planning.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget; the Secretary of Defense; the Secretaries of the Army, Navy, and Air Force; and the Secretary of Transportation.

Comptroller General
of the United States

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ABBREVIATIONS

CONUS continental United States

DOD Department of Defense

GAO General Accounting Office

MSC Military Sealift Command

MTMS Military Traffic Management and Terminal Service

D I G E S T

WHY THE REVIEW WAS MADE

During a general survey of the transportation of ammunition, the General Accounting Office (GAO) observed that cargo space on ammunition ships was not being fully used.

GAO wanted to see to what extent and why such space was unused.

FINDINGS AND CONCLUSIONS

During 1969, 355 Victory- and C2-class ammunition ships departed continental United States (CONUS) ports for the Far East and Southeast Asia with a total of over 200,000 measurement-tons of unused cargo space valued at about \$6.5 million. (See p. 7.)

In planning ammunition shipments, the Department of Defense (DOD) had restricted the amount of cargo to less than the ships could have carried. Since the planned shipload governed the amount of cargo brought into the ports, considerable cargo space was still unused even after all available cargo had been loaded. (See p. 7.)

Although DOD had used about 92 percent of the available space, better shipload planning would have significantly improved the use of cargo space. (See p. 9.)

DOD had no way of knowing that cargo space had not been used effectively because loading personnel were not required to report to DOD when ships sailed with unused space. Also there was no central audit group within DOD which periodically reviewed the use of cargo space. (See p. 7.)

The planned shiploads were increased when GAO brought the matter to the attention of DOD officials, and the use of space on some ammunition ships improved significantly. GAO estimated that improved use of space on Victory- and C2-class vessels resulted in savings of over \$900,000 in fiscal year 1971. (See p. 7.)

Another factor that affected the use of space was the lack of advance notice of pallet sizes. Shipping activities had not provided port personnel with advance data on pallet dimensions. (See p. 18.)

Without such information, port personnel had to rely on past experience to estimate pallet dimensions in preparing loading plans. Subsequent receipt of varying sizes of pallets or sizes different from those used to prepare

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the loading plan sometimes caused (1) port personnel to replan shiploads, (2) expensive double handling of material, and (3) "dead space"--a contributing factor to unused space. (See p. 18.)

Although action was taken during GAO's review to provide advance notice of pallet dimensions, GAO believes that the use of standardized pallets would solve many of the cargo-handling problems noted and would improve ship utilization. (See pp. 26 and 27.)

RECOMMENDATIONS OR SUGGESTIONS

During its review, GAO proposed that DOD:

- Establish a reporting system to provide management with current information on the extent of cargo space used on ammunition ships and the reasons for any unused space. (See p. 14.)
- Evaluate ammunition ship utilization as a part of its regular internal audit program. (See p. 14.)
- Study the feasibility of using a standard pallet configuration for shipments of like items of ammunition. (See p. 27.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

DOD agreed that there was a need for a reporting system to provide timely information on unused cargo space on ammunition ships and indicated that such a system would be established. DOD added that one of its traffic management organizations would monitor space utilization on ammunition ships as an integral part of its internal review program. (See p. 14.)

In response to GAO's proposal that DOD study the feasibility of using a standard pallet configuration for like items of ammunition, DOD stated that service operational requirements may dictate against standard pallets. GAO recognized this, but it believed that a study might develop pallets which would meet each service's requirements while eliminating some of the transportation problems. (See pp. 27 and 28.)

GAO is therefore recommending that the Secretary of Defense direct DOD officials to study the feasibility of using standard pallet configurations for like items of ammunition and to give due consideration to the operational requirements of the military services. (See p. 28.)

Although DOD did not agree that faulty planning was the primary cause of unused cargo space, GAO found that the average load carried on Victory- and C2-class vessels improved significantly after the planning factor was increased. For example, the average loads carried on these vessels was 450 measurement-tons greater in 1971 than in 1969. (See p. 15.)

DOD has not, however, realized similar improvement in the use of larger C3- and C4-type vessels which were not covered by the GAO review because of their infrequent use at the time. These vessels have since become the most frequently used type. (See pp. 16 and 17.)

GAO is therefore recommending that the Secretary of Defense initiate a review of the adequacy of the load-planning factors currently being used for C3- and C4-type vessels. (See p. 17.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

The diminishing capacity of our merchant marine and the difficulty it has experienced in mobilizing to meet the supply-support demands of our military forces in times of emergency long have been of concern to the Congress. GAO believes therefore that the Congress should be aware of instances where such limited resources have not been used most effectively and of the opportunities to effect improvements.

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CHAPTER 1

INTRODUCTION

During fiscal year 1969 DOD spent about \$255 million for the ocean transportation of ammunition. Most of this ammunition was shipped to Southeast Asia.

The responsibility for ocean transportation of ammunition is divided between two single-manager agencies--the Military Sealift Command (MSC) and the Military Traffic Management and Terminal Service (MTMMS). MSC, under the Department of the Navy, is responsible for providing ships to move cargo. MTMMS, under the Department of the Army, arranges with MSC for ships and coordinates the movement of the cargo to the ports.

Each of the services has an inventory control point which controls and distributes that service's ammunition. The using commands submit requisitions for ammunition to their respective inventory control points, which, in turn, notify MTMMS of the need for shipping space.

MTMMS selects the port, requests a ship from MSC, and provides shipping activities with instructions regarding the port of departure from CONUS, the mode and routes to use when shipping to the port, and the day the shipments should start arriving at the port. These procedures were modified for ammunition shipments to Southeast Asia in that MTMMS delegated its traffic management responsibility of port selection to the inventory control points. The control points determined the quantity of ammunition to be loaded on a ship, the port, and the sailing date.

In December 1969, however, DOD requested that MTMMS take a more active role in the management of surface ammunition shipments and restored to MTMMS the responsibility for nominating outloading terminals for full shiploads of ammunition.

Because transporting ammunition requires special precautions, it generally moves through ports used exclusively for handling ammunition. Vessels used to carry ammunition

do not, as a rule, carry other cargo. The primary ports for ammunition at the time of our review were the Naval Ammunition Depots, Bangor, Washington, and Earle, New Jersey; the Naval Weapons Station, Concord, California; and the Military Ocean Terminal, Sunny Point, North Carolina. The port of Bangor was closed in June 1970.

During fiscal year 1969, over 98 percent of the ammunition shipments from CONUS were carried on ships under Government control. The cost for the use of these ships was not based on the amount of cargo carried but was computed on a daily charge for the use of the entire vessel. The daily charge ranged from \$3,400 to \$6,300 depending on such factors as the class and capacity of the ship and its location--the costs were increased about \$900 a day while the vessel was in a war-risk area. The total number of ships required depends, in part, on how effectively available cargo space is used.

Until early 1970 Victory-class ships under General Agency Agreements¹ were the principal class of ships used to transport ammunition to Southeast Asia. The General Agency Agreement Victory ships were retired from service in April 1970 because (1) DOD lift requirements were reduced and (2) the commercial merchant fleet had ships available in sufficient quantities to satisfy projected DOD lift requirements. At the conclusion of our review, C2-, C3-, C4-, and Victory-class ships under time charter to the Navy were being used.

¹Ships activated from the National Defense Reserve Fleet and operated by civilian crews under agreements between the Maritime Administration and commercial shipping companies.

CHAPTER 2

CARGO SPACE UNUSED BECAUSE PLANNED SHIPLoadS WERE TOO LOW

During calendar year 1969, 355 Victory-class ships and C2-class ships departed CONUS ammunition ports for the Far East and Southeast Asia with over 200,000 measurement-tons¹ of unused cargo space valued at about \$6.5 million. Much of this space was unused, in our opinion, because DOD in planning shiploads had restricted the amount of cargo to less than the ships could have carried. Since the planned shiploads governed the amount of cargo brought into the ports, considerable cargo space was unused after all available cargo had been loaded.

DOD had no way of knowing that cargo space had not been used effectively because loading personnel were not required to report to DOD when ships sailed with unused space. Also there was no central audit group within DOD that periodically reviewed the use of cargo space.

The planned shiploads were increased when we brought this matter to the attention of DOD officials, and the use of cargo space on ammunition ships improved significantly. We estimate that improved use of Victory- and C2-class vessels during fiscal year 1971 resulted in savings of about \$900,000. The savings would have been considerably greater if DOD had used as many vessels of this type in 1971 as it did in 1969--377 voyages in 1969 as opposed to 77 voyages in 1971. But by 1971 the Victory- and C2-class vessels were, for the most part, replaced by the larger C3- and C4-class vessels.

We compared the volume of ammunition loaded on these larger vessels in 1971 with the volume loaded on the same types of vessels in 1969. Our comparison showed that there had not been an improvement in the use of available cargo space on these larger vessels similar to that which we

¹A measurement-ton is 40 cubic feet.

noted on the smaller Victory- and C2-class vessels. Therefore we believe that DOD should review utilization of space on C3- and C4-type vessels and evaluate the adequacy and use of load-planning factors for these ships.

ESTIMATE OF UNUSED CARGO SPACE

Our analysis of the loads carried on 355 Victory-class ships and C2-class ships that departed four CONUS ammunition ports during calendar year 1969 showed that over 200,000 measurement-tons of cargo space was unused. On the basis of the direct-operating costs of shipping to Southeast Asia, including per diem and risk bonuses, we estimated that the unused space was valued at about \$6.5 million.

The highlights of our analysis are shown in the following table and are described in detail in appendix II.

<u>Loading port</u>	Number of <u>ships</u>	<u>Measurement-tons</u>		
		<u>Usable capacity</u>	<u>Cargo loaded</u>	<u>Unused space</u>
Bangor	63	460,000	415,000	45,000
Earle	28	202,000	192,000	10,000
Concord	94	676,000	623,000	53,000
Sunny Point	<u>170</u>	<u>1,239,000</u>	<u>1,138,000</u>	<u>101,000</u>
	<u>355</u>	<u>2,577,000</u>	<u>2,368,000</u>	<u>209,000</u>

The above analysis includes only Victory-class ships and C2-class ships. We excluded 22 C3- and C4-class ships loaded with ammunition and other ships loaded with both general cargo and ammunition, because these types were used only to a limited extent during the period reviewed. But our limited review showed that these ships also departed with unused space.

In computing the amount of unused space, we considered that the usable cargo capacity of a Victory ship was about 7,000 measurement-tons (7,500 with deep tanks¹) and the capacity of a C2-type ship was about 8,000 measurement-tons.

¹Added storage capacity below fourth lower hold.

These capacity figures were developed by taking the stated capacity of the various ships and by deducting the estimated space lost because of the shape of the cargo (including palletization); the contour of the ship; and the space occupied by stanchions, pillars, dunnage, and other fixtures.

For example, Victory ships have a stated capacity of about 11,000 measurement-tons and C2-, C3-, and C4-class ships have an even greater capacity. A naval cargo-planning manual indicates that an average of 10 to 15 percent of this space is lost for the reasons stated above, excluding shape of the cargo. The shape of the cargo, especially when palletized, may increase this loss to 30 or 35 percent. Applying these loss figures, the cargo space available on a Victory ship without deep tanks would range from approximately 7,365 to 7,930 measurement-tons. A diagram showing the various holds of a typical Victory ship follows on the next page.

Bangor port personnel, in estimating the usable cargo capacity for palletized cargo, used similar factors. Personnel from other ports, however, estimated that, on the basis of their experience, the cargo capacity of Victory-class ships ranged from 6,800 to 7,200 measurement-tons.

Since MSC successfully used figures similar to ours when it raised its planning factors in February 1970, responsive to our review, there is adequate confirmation of the validity of our estimate of 7,000 measurement-tons as the amount of usable space that is reasonably and usually available on Victory-class ships. In fact, the figure is conservative, since many of the 244 Victory ships that departed CONUS during the period of our review carried loads well in excess of the 7,000-ton figure we had used.

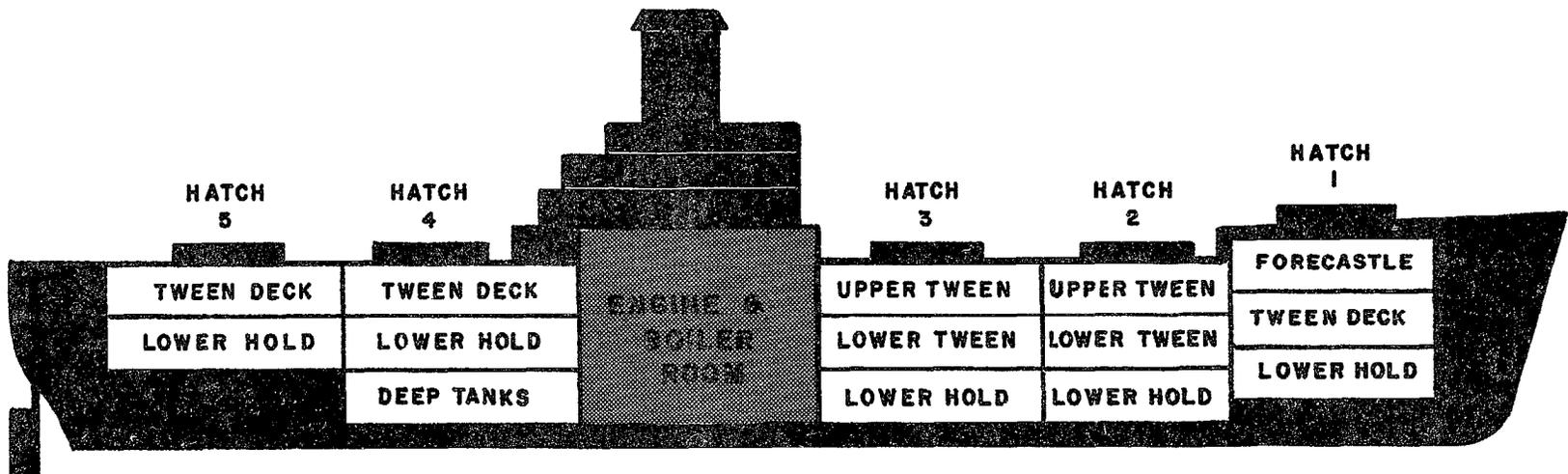
On the basis of a figure of 7,000 measurement-tons, DOD was using about 92 percent of the available space on its ammunition vessels. But, as indicated in the following sections of this report, better shipment planning would have resulted in significantly improved use of cargo space.

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SIDE VIEW OF A TYPICAL VICTORY SHIP
SHOWING THE VARIOUS HOLDS

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 STORAGE AREAS

PLANNING CRITERIA INADEQUATE

Within the ammunition distribution system, as it was functioning during our review, the organizations which ultimately had the greatest impact on vessel utilization were the inventory control points. Control points processed and controlled the ammunition requisitions and the subsequent distribution. The inventory control points made the basic determinations concerning the size of ammunition shipments and notified MTMS of their needs for vessel space. MTMS merely functioned as an intermediary between the services and MSC to arrange for vessels to carry ammunition in quantities designated by the control points. MTMS arranged for loading of the vessels furnished by MSC with the quantities of ammunition released for shipment by the inventory control points. Therefore, to a large extent, the planning criteria used by the control points dictated the effectiveness with which MTMS and MSC could utilize space on ammunition ships.

In planning ammunition shiploads, the inventory control points used a planning factor of 6,500 measurement-tons as a shipload for most Victory ships. Occasionally a different tonnage factor was used on the basis of information from MTMS that a larger ship would be available or that the requisitioner needed a larger quantity.

We found, however, that the planning factor had been too low and that ships had an additional cargo capacity which would have been used if a more realistic figure, such as the 7,000-measurement-ton figure we compiled, had been used for planning purposes.

Officials of the inventory control points and other responsible organizations were unable to furnish to us any information on the development or origin of the 6,500-measurement-ton factor, nor could they provide an analysis of the amount of available but unused space on ships. Officials at one inventory control point told us that the factor had been used by them since 1965. At that time

sheathing and decking¹ were much more extensive than during the period of our review (1969) and therefore the usable space was somewhat less.

In March 1969 MSC, Pacific, advised Western Area, MTMTS, of the results of a study which showed that ammunition ships were sailing from Concord with 500 to 750 measurement-tons of unused space, much of which was available because of reductions in the amount of decking required. But Western Area officials believed, for reasons unexplained, that the planning factor then in effect was adequate.

We were told that there had been a number of other reasons for ammunition ships' being underutilized, such as incompatibility of cargo, multiport discharge necessitating ready or unrestricted access to the cargo, nonarrival and deletion of cargo, weight capacity of ships, and draft limitations of overseas ports. We found, however, that these factors did not significantly affect cargo-space use nor did they occur regularly during the period covered by our review. Shipload-planning personnel at Bangor, Concord, and Sunny Point agreed that ships had been underutilized, even when these factors were considered.

AGENCY ACTIONS

During our review we informed MTMTS and MSC officials of our findings. In response MSC in February 1970 raised the planning factor for Victory ships from 6,500 measurement-tons to 7,000 measurement-tons and established planning factors for the other classes of ships. MSC took this action as an interim measure pending further study. In April 1970 MSC issued the following ammunition shipload-planning factors based on a 38-percent loss of space.

¹Sheathing is covering the bulkhead and sides with lumber forming temporary boundaries of holds, or compartments, within a ship. Decking is a floor built in the bottom of the hold or between tiers of cargo within a hold.

<u>Class</u>	<u>Hatches</u>	Minimum measurement- tons to Vietnam from	
		<u>East coast</u>	<u>West coast</u>
VC-2 (Victory)	5	7,000	7,100
VC-2 with deep tanks (Victory)	5	7,500	7,600
C2-S-AJ1, AJ5	5	7,700 to 8,000	7,900 to 8,200
C2-S-AJ3	5	8,100	8,300
C2-S-B1	5	8,000 to 8,300	8,200 to 8,500
C3	5	11,000	11,300
C3-S-A2	5	8,700 to 10,200	9,000 to 10,500
C4-S-A1, B2, A3	7	11,600	11,900
C4-S-A3 (heavy lift)	5	9,700	10,000
C4-S-A4	7	10,500	10,800
C3-S-37 (LYKES)	5	8,300	8,600
C4-S-57A (U.S. Lines)	6	9,800	10,100
C4-S-64A (U.S. Lines)	6	10,200 ^a	10,500 ^a
C4-S-60A (MORMAC)	6	9,800	10,100
C4-S-66A (LYKES)	6	11,000	11,300

^aIncludes refrigerated space (8,300 measurement-tons without refrigerated space).

With the retirement of the General Agency Agreement ships, MSC is planning to assign the larger C3- and C4-class vessels to the east coast and the smaller C2 and time-chartered Victory ships to the west coast ammunition-loading ports. Eastern Area, MMMS, advised the inventory control points that a planning factor of 8,500 measurement-tons had been established for C3 and C4 ships. Western Area, MMMS, advised inventory control points to use a factor of 7,000 measurement-tons until MSC could provide more complete information on the type of ships it would furnish for loading from west coast ports. These officials told us that the new shipload-planning factor was tentative and that they planned to monitor the vessel loading closely to see whether the factor had been adequate.

AGENCY COMMENTS AND OUR EVALUATION

We brought our findings to the attention of the Secretary of Defense in a draft report dated February 19, 1971, and proposed that DOD establish a reporting system to provide management with current information on the extent to which cargo space was used and the reasons for any unused space. We proposed also that DOD evaluate ammunition ship utilization as a part of its regular internal audit program.

DOD commented on our findings in a letter dated April 20, 1971. (See app. III.) It agreed that there was a need for a reporting system to provide timely information on unused cargo space on ammunition ships and indicated that such a system would be established within MTMTS. DOD added that MTMTS would monitor ammunition ship space utilization as an integral part of its internal review program.

DOD did not agree, however, that planning for less cargo than ships could actually carry was the primary cause for underutilization of ship space. In its response DOD dealt at length with the need for planning factors and various other operational considerations in planning shiploads of ammunition.

In our report we did not question the need for planning factors. Indeed we consider good planning based on valid planning premises to be essential to effective management of DOD's ammunition shipment program. Our review established that the planning premise was faulty in that the planning factor in use was significantly less than the ships' capacity, after considering the various operational factors.

With respect to the other operational factors cited by DOD as affecting ship utilization, we discussed in the draft report a number of reasons cited to us by DOD officials for unused cargo space. But, as pointed out on page 12, we found that these particular factors did not significantly affect the use of cargo space nor did they occur regularly during the period covered by our review.

One factor given prominence in the DOD response was the possible effect that relatively heavy ammunition

shipments had on ship utilization. DOD commented that weight cargo had a direct influence on ship space utilization because a vessel's weight-carrying capacity could be reached before its available storage space was fully utilized. It added that much of the ammunition shipped to South Vietnam in 1969 was weight cargo.

During our review we discussed this subject with DOD officials responsible for loading ammunition ships at Concord. They advised us that weight cargo was not a significant recurring problem and that they could recall only three instances over the period of a year where weight had been a problem. Of these, only one ship had a "poor" load in terms of measurement-tons. Nevertheless we agree that weight in relation to cube is a significant factor to be considered in preshipment planning whether the planning factor is 6,500 or 7,000 measurement-tons.

To underutilize the space in all vessels, however, because of the weight of cargo stowed in some vessels when the weight to cube factors for ammunition can readily be determined in advance results in inefficient vessel utilization. In its response, DOD did not cite any weight problems in using the 7,000-measurement-ton planning figure which we had recommended.

Another operational factor discussed by DOD concerned the limited water depth at certain overseas discharge ports. One port singled out was Cat Lai in Vietnam; but, during our review, we examined records which showed that Victory ships departed CONUS for Cat Lai with shiploads of as much as 8,600 long-tons and 7,000 measurement-tons. We noted also that larger ships with deeper drafts had also been dispatched to Cat Lai. We did not identify any ammunition ship carrying in excess of 6,500 measurement-tons that was unable to discharge at its destination because of port draft limitations.

Although DOD did not agree with our conclusion that planning for less cargo than the ships could actually carry was the primary cause of unused space, we found that the average load carried on Victory- and C2-class ships improved significantly after DOD, in response to our review, increased load-planning factors in February 1970. For example, during fiscal year 1971, the average load on Victory-class ships

was 450 measurement-tons greater than these ships had carried during 1969. Correspondingly the average load on C2-class ships increased by 548 measurement-tons during fiscal year 1971.

Had DOD achieved these load increases during calendar year 1969, unused space valued at about \$5 million would have been used.

It is difficult to measure savings realized by DOD on ammunition shipments during fiscal year 1971 because the ships used by DOD to transport most of its ammunition during this period were larger and had more cargo capacity than did the Victory- and C2-class ships which are the subject of this report. We estimate, however, that DOD saved about \$900,000 during fiscal year 1971 by improving its utilization of the relatively few Victory- and C2-class ships used during the period. For these class ships, we found that DOD used 97.2 percent of available cargo space during fiscal year 1971 as compared with the 91.8 percent experienced in 1969.

Because C3- and C4-type vessels were used infrequently during the period reviewed--1969--our review of these vessels was limited and did not include a review of load-planning factors. However, DOD may not be obtaining optimum utilization of these larger vessels. For example, we found that the C4's which carried more than half the tonnage in 1971 averaged about the same loads in 1971 as they did in 1969.

In addition, we noted that the loads carried on C4's in 1971 varied from 7,700 measurement-tons to a high of 12,400 measurement-tons, which indicated that the vessels' capabilities were considerably greater than the 9,700-measurement-ton average loads being experienced currently.

CONCLUSIONS AND RECOMMENDATION

We believe that the actions taken by DOD to increase the load planning for Victory- and C2-class vessels have resulted in significant savings. This is supported by the fact that the average utilization of these ships increased from 91.8 percent in fiscal year 1969 to 97.2 percent during 1971.

But DOD has not realized a similar improvement in utilization of the larger ships which are used more frequently to transport ammunition. We recommend therefore that the Secretary of Defense initiate a review of the adequacy of the load-planning factors currently being used for C3- and C4-type vessels.

CHAPTER 3

ADVANCE NOTICE OF PALLET SIZES AND STANDARD PALLETS

WOULD RESULT IN BETTER SHIPLOADS

Ammunition ports prepare an advance or prestow plan for stowing ammunition on board ships. This prestow plan, which is prepared in advance of the ship's arrival at the port, is based on advice received from the inventory control points concerning the items, quantity, number of pieces, and the weight in short-tons and measurement-tons.

Shipping activities do not, however, provide advance data on the dimensions of pallets. As a result the ports must rely on past experience in estimating pallet dimensions and in preparing prestow plans. But we found that identical material had been shipped by depots and manufacturers on varying sizes of pallets which, in some cases, caused (1) port personnel to replan shiploads, (2) expensive double handling of material, or (3) "dead space," a factor contributing to nonuse of available space.

The Naval Audit Service found that there was a need for shipping activities to include packaging and pallet configurations on the report of shipment sent to port, and it reported this matter to the Commander, Naval Ordnance Systems Command, in February 1969. The Naval Audit Service estimated that it cost Concord about \$330,000 a year to rehandle items received in other than the expected pallet sizes.

Despite this advice we found that the loading ports were still receiving material without advance notice of the measurements. Examples follow of material received that had different measurements.

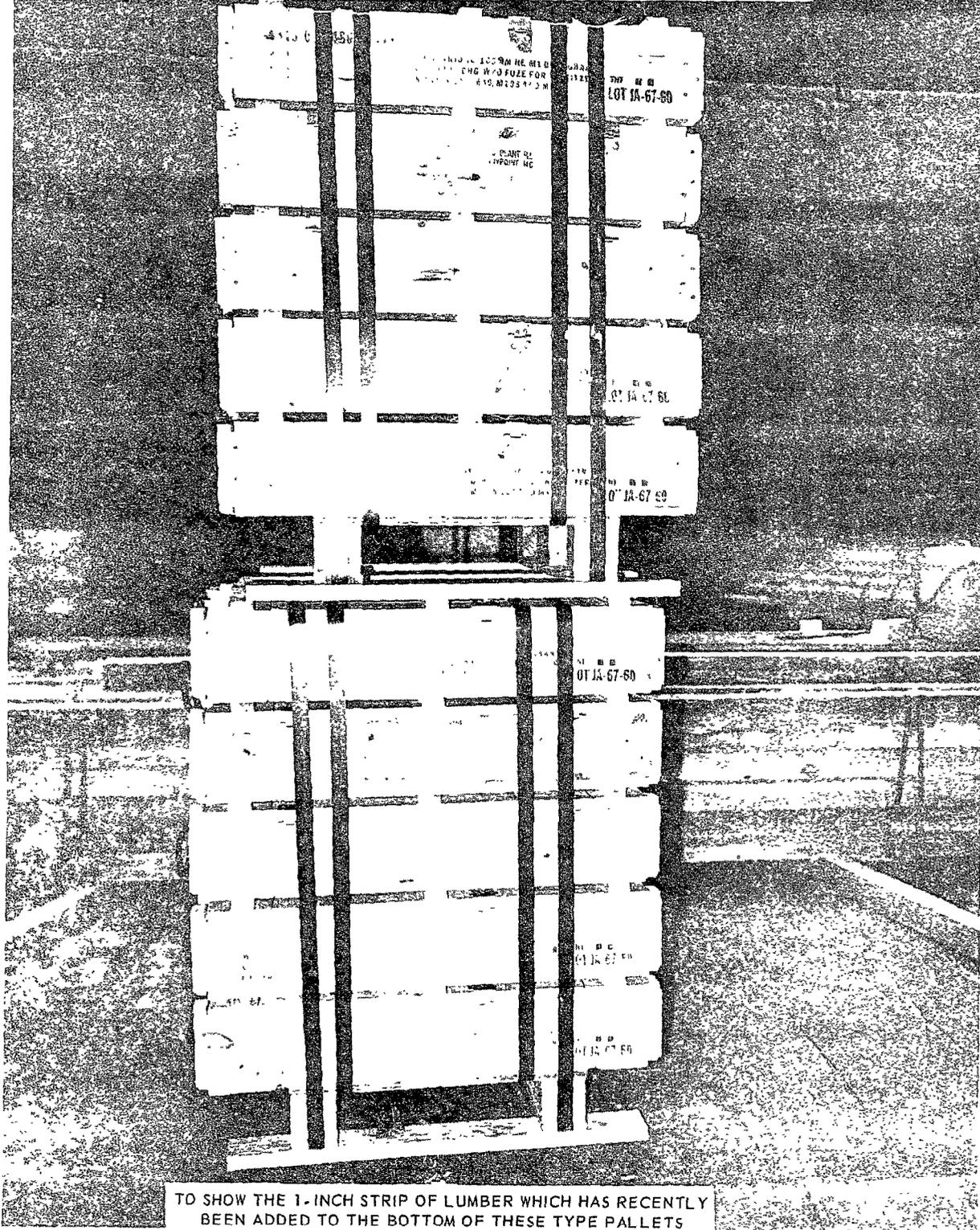
1. Sunny Point received 105 mm cartridges in two pallet configurations--both the same except that a 1-inch board had been added to the bottom of one pallet. Sunny Point officials told us that, because of the 1-inch board, they had been able to stack pallets in the ship only two high whereas the pallets previously had been stacked three high. They believed

that the ship's capacity had been reduced by about 260 pallets, or about 220 measurement-tons of cargo space. Eastern Area, MTMS, officials told us that they had not been aware of this problem but would look into it.

Earle received 105 mm cartridges in the same two pallet configurations as did Sunny Point. In addition, it received a third configuration on shipments made from Joliet Arsenal and Savanna Army Depot, Illinois.

Pictures showing the pallets and the loss of storage space follow.

**PHOTOGRAPH SHOWING 105 MILLIMETER PROJECTILES MOUNTED
ON A SHIPPING PALLET**



TO SHOW THE 1-INCH STRIP OF LUMBER WHICH HAS RECENTLY
BEEN ADDED TO THE BOTTOM OF THESE TYPE PALLETS

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PHOTOGRAPH SHOWING 105 MILLIMETER PROJECTILES STOWED IN THE HOLD OF A CARGO SHIP.

TO SHOW THE AMOUNT OF SPACE LOST DUE TO THE HEIGHT OF THE PALLET PRESENTLY BEING USED IN PACKAGING 105 MM PROJECTILES



2. At least four naval installations (Crane, Indiana; Yorktown, Virginia; McAlester, Oklahoma; and Hawthorne, Nevada) packaged 500-pound bombs for Air Force and Navy use. The Air Force pallets are wooden and are received in two configurations. One pallet can be stacked four high; whereas the other can be stacked only three high. We were told that all Air Force depots would soon be using the larger pallets.

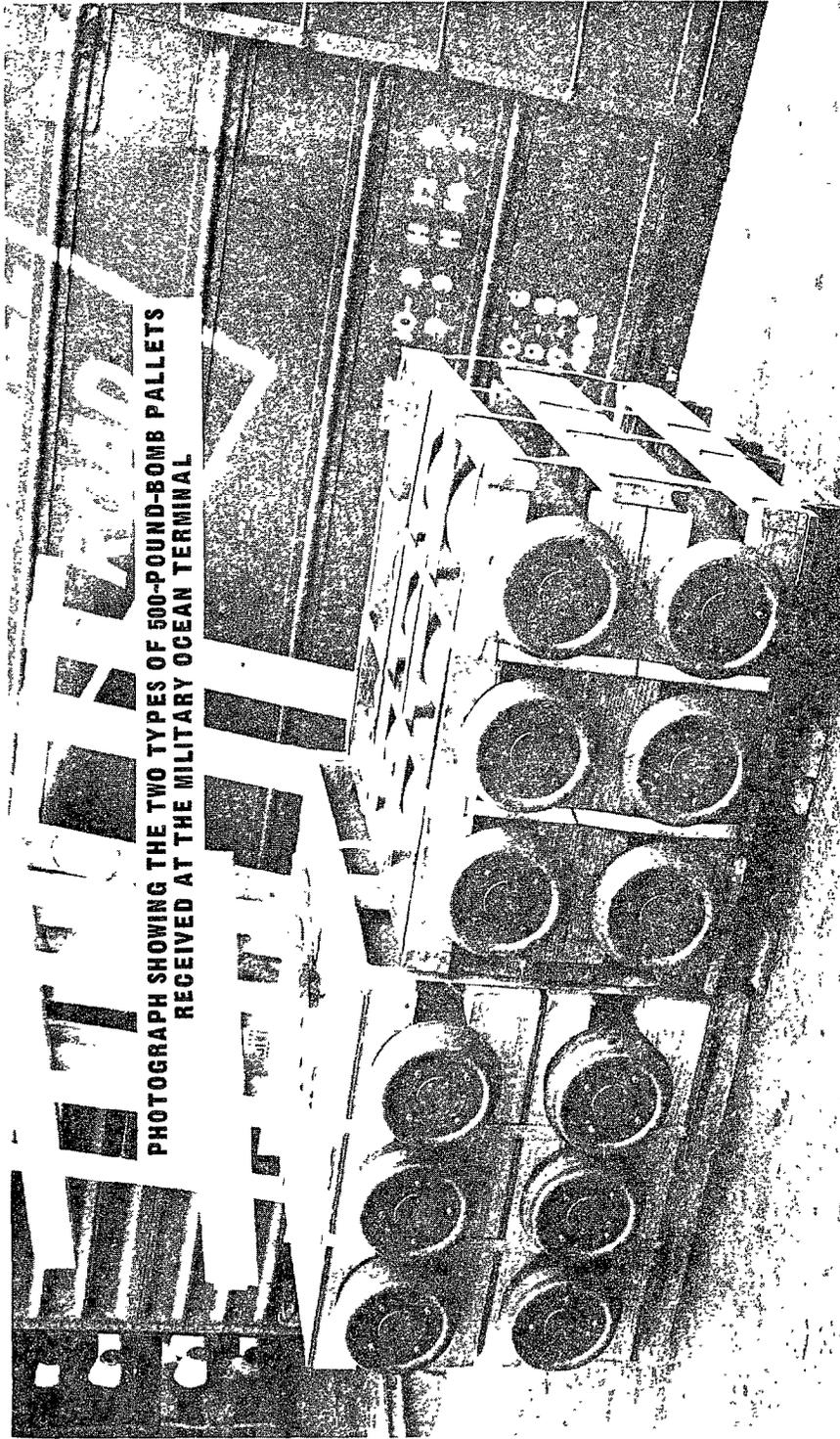
The Navy pallets are metal and can be stacked four high. We were told, however, that the Navy metal pallet was constructed for use aboard ship and was not completely adaptable for Air Force use.

Pictures showing the variance in pallet heights and the effect on stowage follow.

3. The 2.75-inch rocket is shipped from McAlester, Oklahoma, to Concord on pallets that can be stacked four high in the hold of an ammunition ship. Other depots are using a pallet for the same rocket which can be stacked only three high. The Air Force inventory control point indicated that the package configuration had been left up to various depots. When we brought this matter to the attention of officials at the Air Force control point, we were told that action would be taken to standardize the pallet size used for this item.

Concord advised Western Area, MIMIS, of other examples of shipload replanning caused by lack of advance knowledge of pallet configuration. For example, one ship was loaded with 2.75-inch rockets which arrived in pallets of three different sizes that varied from 39 to 48.6 cubic feet and from 41 to 50.5 inches high. In another example, bomb fins were planned for stowage at the usual pack of six fins to a crate. When received at the port, however, the fins were packed 50 to a crate, which necessitated changing the prestow plan and delayed shiploading.

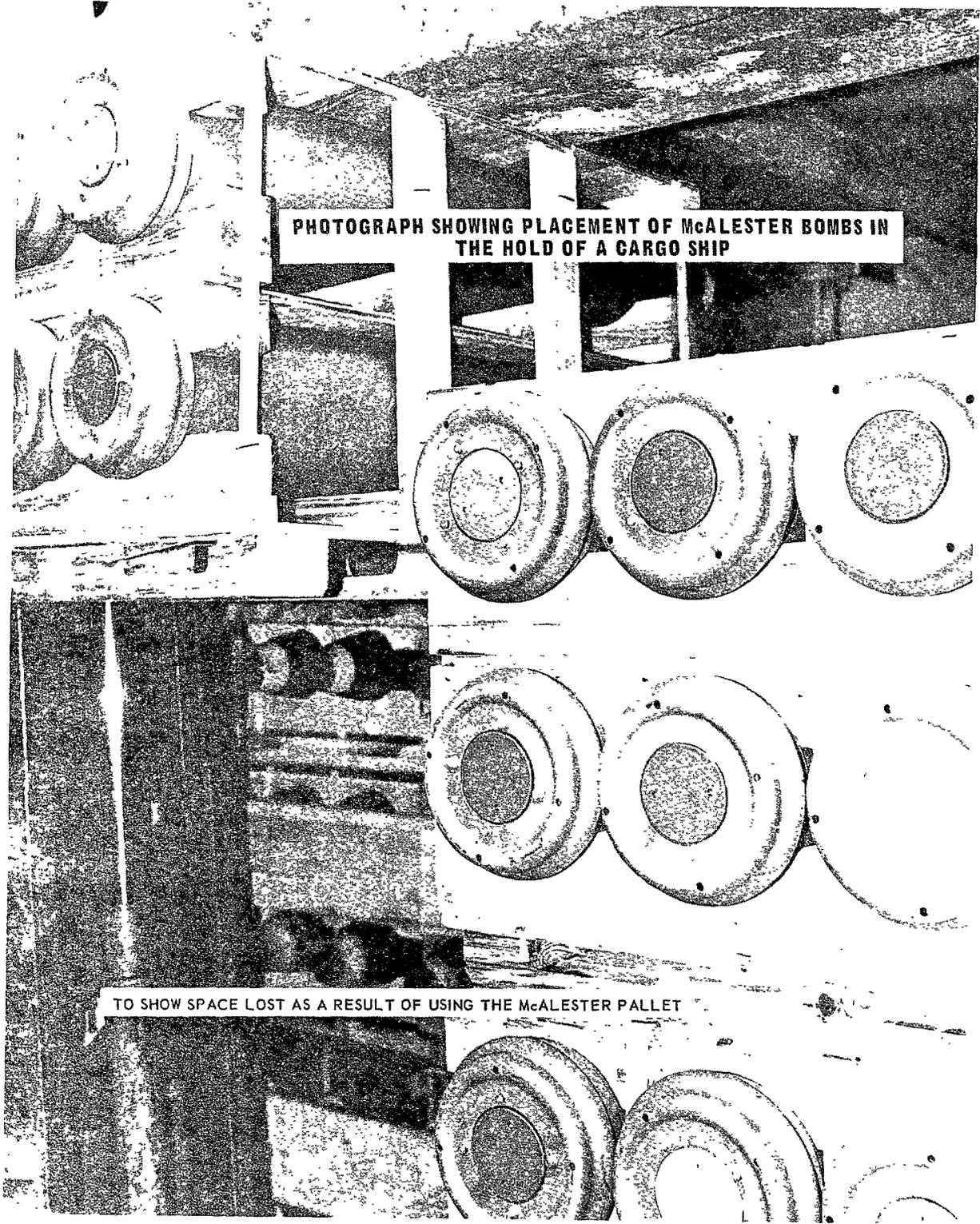
Personnel at the activities we visited believed that advance information or standardization of pallet configurations would result in better planning of shiploads and



PHOTOGRAPH SHOWING THE TWO TYPES OF 500-POUND-BOMB PALLET
RECEIVED AT THE MILITARY OCEAN TERMINAL

TO SHOW THE DIFFERENCES IN THE HEIGHTS OF THE TWO PALLET

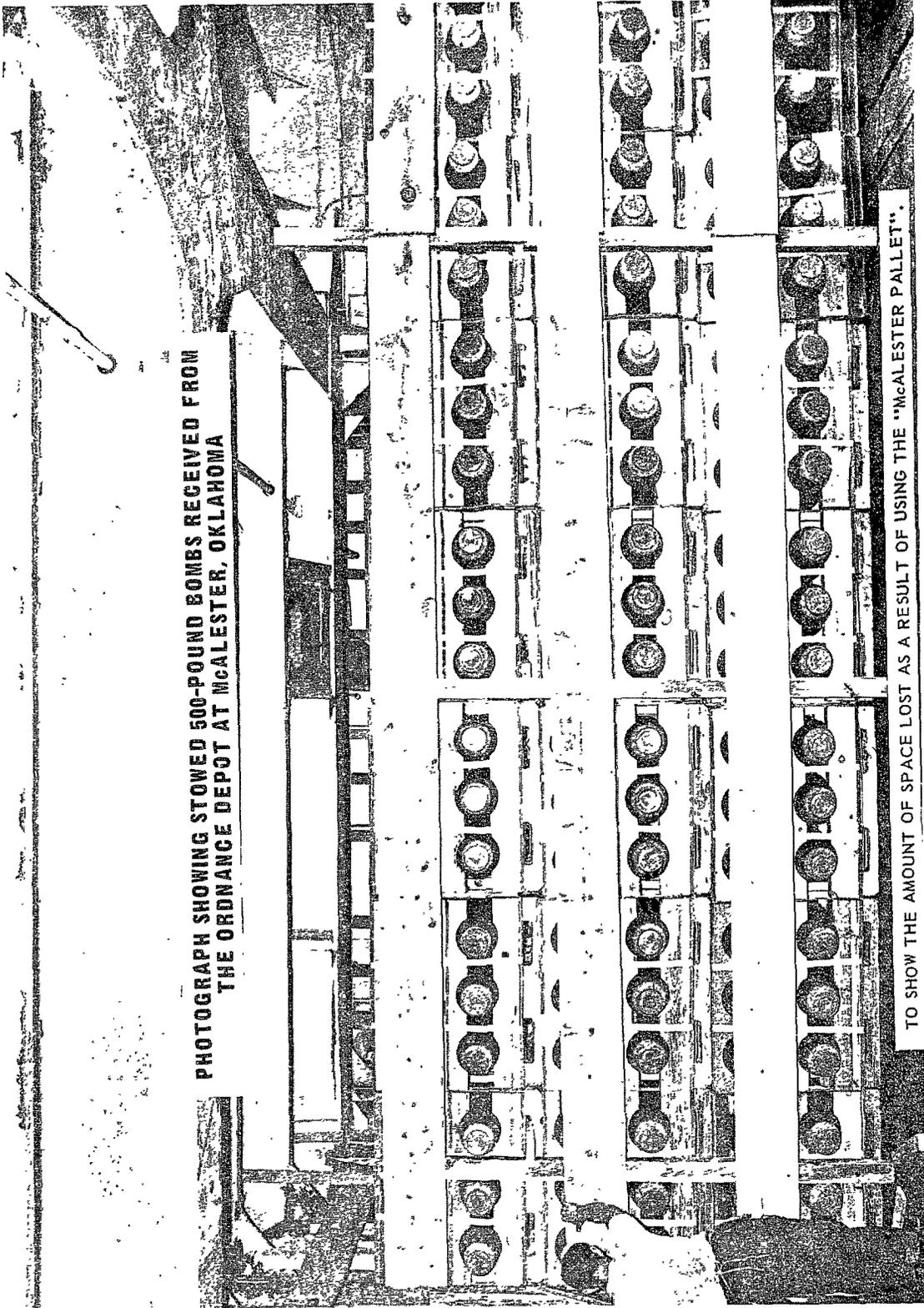
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PHOTOGRAPH SHOWING PLACEMENT OF McALESTER BOMBS IN THE HOLD OF A CARGO SHIP

TO SHOW SPACE LOST AS A RESULT OF USING THE McALESTER PALLET

PHOTOGRAPH SHOWING STOWED 500-POUND BOMBS RECEIVED FROM
THE ORDNANCE DEPOT AT McALESTER, OKLAHOMA



TO SHOW THE AMOUNT OF SPACE LOST AS A RESULT OF USING THE "McALESTER PALLET".

should increase ship utilization. These personnel told us that each service determined how its material would be palletized and that in some cases the decision was left to the various production plants and depots. We learned that the Army inventory control point was making a study of standardization of pallets used by the Army and the study would consider stowage aboard ships. These personnel told us also that no single group within DOD was responsible for standardizing package configurations for like items shipped by different services.

We brought the problem to the attention of Western Area, MTMTS, officials who told us that the need to standardize pallets had been reported to their headquarters. They have stated that, until specific steps are taken by DOD agencies involved to standardize munition pallets, the Military Standard Transportation and Movement Procedures manual is being amended to require the pallet dimensions on the report of shipment.

AGENCY COMMENTS AND OUR EVALUATION

In our February 19, 1971, draft report, we concluded that showing pallet configuration measurements on the report of shipment should lessen the need for replanning shiploads and should reduce double handling. But we expressed the belief that the use of standardized pallets would solve many of the problems we observed and would improve ship utilization. We therefore proposed that DOD study the feasibility of using a standard pallet configuration for like items of ammunition.

In its April 20, 1971, response (see app. III), DOD agreed in principle on the use of standardized pallets for shipping like items of ammunition but stated that service-peculiar operational requirements may dictate against a standardized pallet configuration. As an example, it cited the need for three types of pallet configurations for the MK82 500-pound bomb. For this ammunition item DOD pointed out (1) that the Navy needed a metal pallet for use aboard ships and a wooden pallet for use on land-based aircraft and (2) that the Air Force required a wooden pallet of different configuration than that used by the Navy.

DOD stated that there was a high degree of standardization achieved by a working group which was established by the commanders of the materiel commands of the Army and Navy and by the systems and logistics commands of the Air Force. It believed that this was an appropriate and effective mechanism to deal with and enforce such standardization as operational and tactical considerations allowed.

We recognized that operational requirements may require a special pallet configuration, such as the metal pallet used by the Navy for transferring bombs at sea, and we did not suggest elimination of these pallets. We did question, however, the need for two different configurations of wooden pallets in use by the Navy and Air Force for this 500-pound bomb when (1) all the bombs had originated in Navy depots, (2) the bombs had been delivered to land bases, and (3) the bombs had possibly been used on the same type of aircraft.

We believed that, in this situation, a study might develop a common pallet which would meet service-peculiar requirements and at the same time eliminate the transportation problems discussed in this report.

Upon receipt of DOD's response to our draft report, we contacted the study group which DOD believed had provided an effective mechanism to deal with and enforce standardization. We were informed that the group was established in 1964 but had not focused its attention on standardizing packaging and palletizing like items of ammunition.

CONCLUSIONS

We believe that the inclusion of pallet configuration measurements on the report of shipment will lessen the need for replanning shiploads and will reduce double handling. In our opinion, however, there is an opportunity to improve ship utilization by using standardized pallets.

RECOMMENDATION

We recommend, therefore, that the Secretary of Defense direct DOD officials to study the feasibility of using a standard pallet configuration for like items of ammunition and to give due consideration to the operational requirements of the services. We believe that a study should consider the effect on the operations of the shipper and recipient and also the effect on the utilization by the various modes of carriers (trucks, rail cars, and ships) normally used for transporting ammunition.

CHAPTER 4

SCOPE OF REVIEW

Our review included (1) an examination into pertinent regulations, (2) interviews with transportation and shipload-planning officials, and (3) studies of loaded ships to ascertain whether cargo space was used effectively. We also examined into other factors which had an effect on ship utilization, such as compatibility of cargo, selective or multiport discharge, nonarrival and deletion of cargo, weight-capacity limitations of ships, and draft limitations of overseas ports.

The installations visited are listed in appendix I.

LIST OF ACTIVITIES VISITED DURING THIS REVIEW

ARMY:

Headquarters, Military Traffic Management and Terminal
Service, Washington, D.C.
Western Area, Oakland, California
Eastern Area, New York, N.Y.
Military Ocean Terminal, Sunny Point, North Carolina

NAVY:

Headquarters, Military Sealift Command, Washington, D.C.
Pacific, Oakland, California
Atlantic, New York, N.Y.
Ships Parts Control Center, Mechanicsburg, Pennsylvania
Naval Ammunition Depot, Bangor, Washington
Naval Weapons Station, Concord, California
Naval Ammunition Depot, Earle, New Jersey

AIR FORCE:

Ogden Air Materiel Area, Ogden, Utah

COAST GUARD:

13th Coast Guard District, Seattle, Washington
Third Coast Guard District, Governor's Island, New York

APPENDIX II

UTILIZATION OF VICTORY AND C2 SHIPS THAT DEPARTED
CONUS LOADING PORTS DURING CALENDAR YEAR 1969

Port	Number of ships	Measurement-tons				Total estimated underutilization of cargo space
		Cargo loaded	Average load	Cargo capacity a ship (note a)	Total cargo capacity	
VICTORY:						
Bangor	40	259,628	6,490	7,000	280,000	20,372
Earle	21	142,079	6,766	-	147,000	4,921
Concord	69	447,946	6,497	-	483,000	35,054
Sunny Point	<u>114</u>	<u>735,385</u>	<u>6,451</u>	<u>-</u>	<u>798,000</u>	<u>62,615</u>
Total	<u>244</u>	<u>1,585,038</u>	<u>6,496</u>	<u>7,000</u>	<u>1,708,000</u>	<u>122,962</u>
VICTORY WITH DEEP TANKS:						
Bangor	7	45,205	6,458	7,500	52,500	7,295
Earle	2	14,022	7,011	-	15,000	978
Concord	15	101,259	6,751	-	112,500	11,241
Sunny Point	<u>14</u>	<u>93,809</u>	<u>6,701</u>	<u>-</u>	<u>105,000</u>	<u>11,191</u>
Total	<u>38</u>	<u>254,295</u>	<u>6,692</u>	<u>7,500</u>	<u>285,000</u>	<u>30,705</u>
C2:						
Bangor	16	110,141	6,884	8,000 ^b	128,000	17,859
Earle	5	35,963	7,193	-	40,000	4,037
Concord	10	73,625	7,363	-	80,000	6,375
Sunny Point	<u>42</u>	<u>308,721</u>	<u>7,351</u>	<u>-</u>	<u>336,000</u>	<u>27,279</u>
Total	<u>73</u>	<u>528,450</u>	<u>7,239</u>	<u>8,000</u>	<u>584,000</u>	<u>55,550</u>
Total	<u>355</u>	<u>2,367,783</u>	<u>6,670</u>		<u>2,577,000</u>	<u>209,217</u>

^aBased on MSC's criteria as to minimum capacity of ships.

^bRanges from 7,700 to 8,500 measurement tons depending on the type of C2 ships. We used 8,000 in computation of this schedule.

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ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

20 APR 1971

TRANSPORTATION AND LOGISTICS

Mr. T. E. Sullivan
Director, Transportation Division
U. S. General Accounting Office
Washington, D. C. 20548

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Dear Mr. Sullivan:

This responds to your letter of February 19, 1971 which forwarded copies of your draft report to the Congress entitled, "Opportunity to Improve Use of Cargo Space on Ammunition Ships", Code 43139 (OSD Case 3240).

A reporting system to provide timely information on unused cargo space on ammunition ships will be established within the Military Traffic Management and Terminal Service (MTMTS). MTMTS will also monitor ammunition ship space utilization as an integral part of its internal review program.

Pallet configuration measurements are now included in the report of shipment required by MILSTAMP. We agree in principle with your conclusion (page 24) on the use of standardized pallets for shipping like items. It should be noted, however, that the ammunition distribution system must be responsive to operational requirements. The 500 pound bomb (MK82) is cited on page 19 of the report as an example of non-standardization of pallet configuration. There are, at present, three types of pallet configuration in use for the MK82. The Navy uses, as a service peculiar requirement, a metal pallet in order to reduce the amount of flammable materials on aircraft carriers and to facilitate at-sea transfers during underway replenishment. The Navy also uses a wooden pallet for land-based aircraft. Both the Navy and the Air Force used this pallet prior to 1969 when the Air Force decided to use a different pallet for operational reasons. Its high volume of bomb consumption dictated the use of forklifts for bomb handling while the Navy continued to use slings to handle its bombs. The implications of having two types of wooden pallets were considered and accepted by both the Navy and Air Force. The Air Force adoption of the new pallet was also influenced by the recommendation of a Board which investigated an Air Force accident involving the handling of the palletized bombs. The fact is that the pallet used by each of the services best meets its needs.

APPENDIX III

The report (page 23) also points out variations in palletization and container sizes for the 2.75 inch rockets. These result from the many variations (more than 30) in the 2.75 inch rocket itself. The rocket variations stem from the fact that different types of rocket motors are used for high speed and low speed aircraft and each may be fitted with different warheads of different sizes for tactical reasons. As a result, rocket weights and lengths vary considerably. Finally, some warheads, such as White Phosphorous must be palletized in a vertical orientation because of the nature of the material, while most rockets are palletized horizontally.

Pallets used in the ammunition distribution system are changed as new materials or more economical methods are developed. As a result, new production ammunition may be configured in one pallet size while older stock from a depot will be in the old configuration. It is impractical to re-palletize ammunition in stock for the sole purpose of achieving pallet standardization. This is what happened in the case of the 105 millimeter pallets cited on page 16 of the report. These pallets were changed to facilitate handling by rough terrain forklifts in South Vietnam.

With reference to your recommendation that DoD study the feasibility of standardizing packaging and palletizing of like ammunition items, there is a high degree of standardization achieved by a working group which is chartered by the Commanders of the Materiel Commands of the Army and Navy and the Systems and Logistics Commands of the Air Force. This is an appropriate and effective mechanism to deal with and enforce such standardization as operational and tactical considerations allow. It should be noted that the Program/Project Manager of the end item controls the pallet configuration and not the production activity as suggested in the report.

[See GAO note.]

GAO note: The deleted comments relate to matters which were discussed in the draft report but omitted from this final report.

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The following statement, which is quoted from page 1 of the Digest is misleading: "During 1969, Victory and C-2 class ammunition ships departed continental United States (CONUS) ports for the Far East and Southeast Asia with over 200,000 measurement tons of unused cargo space valued at about \$6.6 million." It is misleading because there is no indication in the Digest that the used space (2,368,000 measurement tons) when compared with the available space (2,577,000) represent a utilization factor of 91.8 percent. The statement is also misleading because the Digest does not mention the number (355) of ships involved. The individual who reads only the Digest has no way of knowing that the unutilized space averaged less than 600 measurement tons (M/Ts) per vessel and that 91.8 percent of the available space was utilized.

We do not agree with the conclusion (page 14) that planning for less cargo than ships can actually carry was the primary cause for under-utilization of ship space. The use of planning factors facilitated the complex coordination required to get the needed types of ammunition in the required amounts to the ports in time to meet the vessels for which it was intended. In our effort to minimize pipeline inventory, the planning for ship loading was in most cases initiated and completed on a planning factor basis because it was necessary to start the cargo to the ports before the actual ships to be loaded were known. The alternatives were either to lengthen the inventory pipeline or to miss required delivery dates. Neither alternative is acceptable.

APPENDIX III

The Victory ship planning factor of 6500 M/Ts, which is cited throughout the report, allowed for the different stowage factors (weight/cube relationship) of ammunition, the modifications which had been made to some "type" ships, production and inland transportation difficulties, oversea port limitations, ammunition stowage compatibility and other operational factors. Consideration also had to be given to such vessel operational matters as labor disputes, crewing problems, ship breakdowns and storms at sea which caused delay in the designation of ships. These factors also delayed designated ships with the result that another vessel, possibly of another type, would have to be substituted to assure that the required delivery date was met. The usefulness of the knowledge of the actual capacity of a vessel is directly related to the timeliness with which circumstances permit the final designation of the vessel to be loaded to be known. In this connection, our CONUS ammunition ports do not have a surge capacity to allow the holding of ammunition to fill the space aboard a vessel which becomes available because of the non-arrival of ammunition due to production or transportation delays or the substitution of a ship larger than expected. Neither do the ammunition terminals have a surge capability which would permit the calling forward of an amount of ammunition greater than vessel capacity in the expectation that some of the amount called forward might not arrive.

The report's conclusion (page 14) as to the primary cause of space underutilization also ignores the fact that much of the ammunition sent to South Vietnam during Calendar Year 1969 was weight cargo rather than measurement cargo, i. e., cargo which utilizes the weight capacity of a vessel or a vessel's hold before the measurement capacity is reached. This was especially true of ground ammunition requirements during 1969 when 105, 155 and 175 millimeter shells were fired at increased rates in order to minimize casualties and to compensate for troop withdrawals. These shells, which represented more than 50% of all the Army ammunition shipped during 1969, are items of weight cargo. These items were also a significant portion of Marine ammunition requirements.

The utilization of the available cubic space of an ammunition ship is not the sole measure of loading efficiency especially when it is understood that the bulk of Army and Marine ammunition is weight cargo. The measurement of ammunition ship loading efficiency is also affected by Coast Guard stowage compatibility requirements, by the idiosyncrasies of the ship's Master who is the final authority on ammunition stowage,

and by the draft limitations of the overseas discharge ports. Despite the report's statement that oversea draft limitations did not significantly affect vessel loading, it is a fact that Cat Lai, which received more Army ammunition in 1969 than any other RVN port, is located on a tidal river with a limited water depth. Its draft limitations, and those of other RVN ports were a factor in CONUS ammunition vessel loading.

Although the report dismisses weight as a negligible consideration, total weight tons and the distribution of weight on a vessel are at least as important to vessel loading efficiency as space utilization. In the view of a ship's Master, who is the final loading authority, weight considerations are more important than space utilization. He may approve a loading plan which shows unutilized space, but he will not permit loading to commence when the loading plan shows poor weight distribution or excess weight.

The planning factors now in use are more accurate because the elimination of the GAA vessels has reduced the number of ship delays and consequent vessel substitutions and because the improvement in the resupply situation has permitted the more effective distribution of ammunition. The draft report's claim that planning for less cargo than ships can actually carry was the primary cause for the under-utilization is not borne out by the facts. This conclusion ignores all of the operational considerations which affected ship loading. The underlying premise of the report that space utilization is the only measurement of shiploading efficiency is unsound; it is only one of the measurements. Finally, shiploading efficiency is not a significant measurement of the success or failure of the ammunition distribution system.

We appreciate the opportunity to comment on the draft report and hope that our comments have helped to clarify the issues involved.

Sincerely,



Glenn V. Gibson
Deputy Assistant Secretary of Defense

APPENDIX IV

PRINCIPAL OFFICIALS
 OF THE DEPARTMENT OF DEFENSE
 AND THE DEPARTMENTS OF THE ARMY,
 NAVY, AND AIR FORCE RESPONSIBLE
 FOR THE ADMINISTRATION OF ACTIVITIES
 DISCUSSED IN THIS REPORT

<u>Tenure of office</u>	
<u>From</u>	<u>To</u>

DEPARTMENT OF DEFENSE

SECRETARY OF DEFENSE:

Melvin R. Laird	Jan. 1969	Present
Clark M. Clifford	Mar. 1968	Jan. 1969
Robert S. McNamara	Jan. 1961	Feb. 1968

DEPUTY SECRETARY OF DEFENSE:

David Packard	Jan. 1969	Present
Paul H. Nitze	July 1967	Jan. 1969
Cyrus R. Vance	Jan. 1964	June 1967

ASSISTANT SECRETARY OF DEFENSE
 (INSTALLATIONS AND LOGISTICS):

Barry J. Shillito	Jan. 1969	Present
Thomas D. Morris	Sept. 1967	Jan. 1969
Paul R. Ignatius	Dec. 1964	Aug. 1967

DEPARTMENT OF THE ARMY

SECRETARY OF THE ARMY:

Robert F. Froelke	July 1971	Present
Stanley R. Resor	July 1965	June 1971
Stephen Ailes	Jan. 1964	July 1965

<u>Tenure of office</u>		
	<u>From</u>	<u>To</u>

DEPARTMENT OF THE ARMY (continued)ASSISTANT SECRETARY OF THE ARMY
(INSTALLATIONS AND LOGISTICS):

Dudley C. Mecum	Oct. 1971	Present
Vincent P. Huggard (acting)	June 1971	Oct. 1971
J. Ronald Fox	June 1969	June 1971
Vincent P. Huggard (acting)	Feb. 1969	June 1969
Robert A. Brooks	Oct. 1965	Feb. 1969

DEPARTMENT OF THE NAVY

SECRETARY OF THE NAVY:

John H. Chafee	Jan. 1969	Present
Paul R. Ignatius	Sept. 1967	Jan. 1969
Charles F. Baird (acting)	Aug. 1967	Aug. 1967
Robert H. B. Baldwin (acting)	July 1967	July 1967
Paul H. Nitze	Nov. 1963	June 1967

ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND LOGISTICS):

Frank K. Sanders	Feb. 1969	Present
Barry J. Shillito	Apr. 1968	Jan. 1969
Vacant	Feb. 1968	Apr. 1968
Graeme C. Bannerman	Feb. 1965	Feb. 1968

DEPARTMENT OF THE AIR FORCE

SECRETARY OF THE AIR FORCE:

Robert C. Seamans, Jr.	Jan. 1969	Present
Dr. Harold Brown	Oct. 1965	Jan. 1969
Eugene M. Zuckert	Jan. 1961	Sept. 1965

ASSISTANT SECRETARY OF THE AIR
FORCE (INSTALLATIONS AND LOGIS-
TICS):

Philip N. Whittaker	May 1969	Present
Robert H. Charles	Nov. 1963	May 1969

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